REMARKS

This Amendment, submitted in conjunction with a Request for Continued Examination, is responsive to the Office Action dated October 21, 2003. A Request for Extension of Time and the appropriate fee are attached hereto.

As of October 21, 2003 mailing date of the Office Action, Claims 1, 3, 4, 6-13 and 19-41 were pending. The subject claims were divided into three claims sets that stemmed from three independent claims, Claims 1, 19 and 33. In order to simplify the issues, however, Applicant has elected to cancel Claims 19-41, without prejudice, such that only one set of claims is pending. Applicant has also added a new dependent Claim 45 that corresponds to a "second layer" of metal-containing prepreg that was previously recited in Claim 1. Applicant respectfully requests reconsideration as to remaining Claims 1, 3, 4, 6-13, and 45.

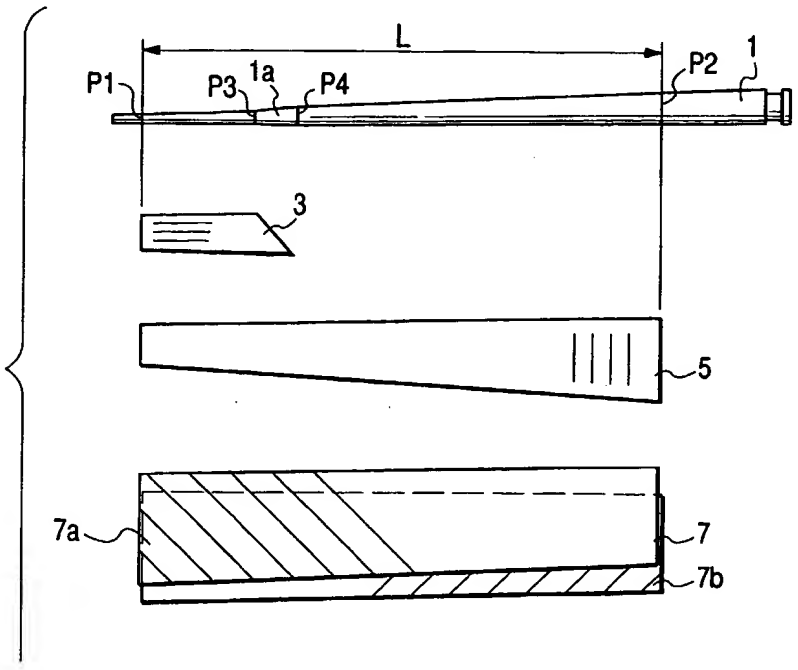
The Office Action rejects Claim 1 under 35 U.S.C. §103(a) as being unpatentable over Kusumoto (6,306,047) in view of Hsu (6,302,806) and Honma (5,049,422). Applicants respectfully traverses this rejection, however, based on the above amendments and the following remarks. In particular, amended Claim 1 is allowable over the cited combination as more fully explained below.

Applicant's claimed invention uniquely involves "a first internal layer of metal-containing prepreg wrapped at a tip of the shaft...". As further set forth in amended Claim 1, the first internal layer of metal-containing prepreg is uniquely located along a length of the shaft between a first distal location at a tip of the shaft and a second more proximal location of the shaft in order to simultaneously reinforce the tip of the golf club shaft (which reduces toe-down during the swing as suggested by Figures 14a and 14b),

increase the mass of the golf club shaft, and shifts the shaft's center of mass upward. The Office Action rejects the claimed invention (as previously claimed) as obvious over a combination of not one, or even two, but three golf club references. Given that the golf club art is crowded, very mature, and highly-patented, and given that the claimed invention offers numerous cost reduction and performance advantages, Applicant respectfully submits that its claimed invention is patentable over the cited combination of numerous references as explained further below.

Kusumoto discloses a golf club shaft that is formed by winding prepreg sheets around a metal core 1, or mandrel, with a "front (distal) end portion" P1, a rear (proximal) end portion" P2, that are connected by a "steeply-tapering portion" 1a:

FIG. 1



Applicant acknowledges that Kusumoto's golf club shaft is formed on a metal core 1 that is comparable to the mandrel described in the preamble of Applicant's claim,

i.e. "a mandrel with a main body having a body surface and a mandrel tip having a tip surface that is recessed relative to the body surface". However, Applicant respectfully traverses the Office Action's assertion that one of ordinary skill in the art would find it obvious to replace a particular one of Kusumoto's ordinary, non-metal, carbon fiber, prepreg layers with a metal-containing prepreg as required by Applicant's Claim 1 - i.e. Kusumoto's prepreg layer 3. There is no basis in Kusumoto or any of the secondary references for modifying Kusomoto to achieve Applicant's claimed invention. The Office Action makes this assertion only with the benefit of hindsight gained from having reviewed Applicant's disclosure and related claims. Applicant's claims, of course, cannot be the motivation for the hypothetical combination. There must be something in the references themselves.

In particular, Kusumoto is completely silent as to the use of a metal-containing prepreg sheet at the tip of the shaft. Kusumoto, in fact, specifically teaches that all of its prepreg sheets are standard, carbon-fiber sheets:

> Each of the prepreg sheets is formed by arranging or orienting carbon fibers in one direction and by impregnating these fibers with a thermosetting resis..."
>
> (col. 5, lines 35-38, emphasis added)

Kusumoto even specifies such carbon fiber constuction with specific reference to prepreg sheet 3:

> The prepreg sheet 3 ... comprises ... carbon fibers (having an elastic modulus of 24 tonf/mm^2) oriented in the axial direction, ... and the amount of the fibers is 125 g/m2, ...

(col. 5, lines 42-44, emphasis added).

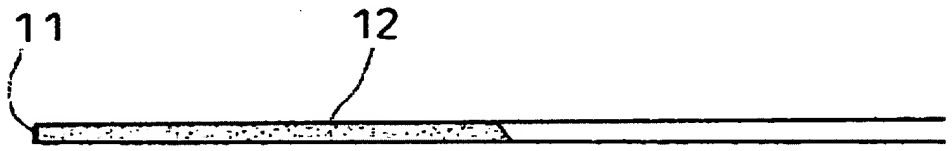
The Office Action explicitly acknowledges that Kusumoto "lacks a first layer containing metal fibers". However, the Office Action then goes on to assert that because Hsu "discloses adding a weighted segment at a tip end of a shaft for lowering the position of the center of gravity," it follows that "it would have been obvious to modify the shaft of Kusumoto to have a layer of metal fibers containing prepreg wrapped at a tip of a shaft in order to lower the center of gravity of the shaft as well as provide reinforcement."

Applicant respectfully traverses this assertion of obviousness, especially as relevant to amended Claim 1 which requires "a first internal layer of metal-containing prepreg", because Kusumoto does not teach any metal-containing prepreg and Hsu only teaches that the tip end of a golf club shaft may include a so-called "weighted segment 12" formed on the outside of the shaft. The precise construction of Hsu's golf club shaft is somewhat uncertain. It is absolutely clear, however, that Hsu does not teach "a first internal layer of metal-containing prepreg" as required by amended Claim 1. For example, Hsu explicitly says that metal filaments are on the shaft's outside:

> The shaft 10 has a tip end 11 which is provided with a weighted segment 12 formed of metal filaments on the outermost layer of the tip end 11.

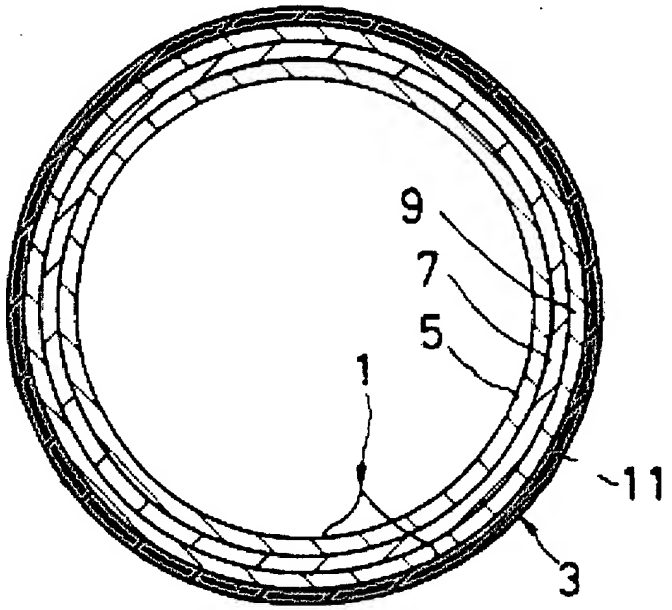
(col. 1, lines 58-61, emphasis added).

Moreover, since a picture is worth a thousand words, Hsu's Figure 1 shows the metal filaments that form the weighted segment 12 on the shaft's exterior:



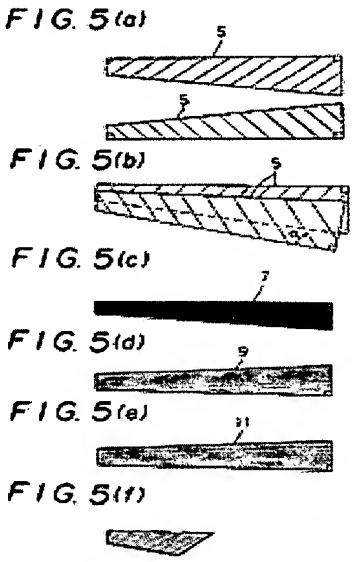
The Office Action also cited Honma because, according to the Action, "Honma discloses layers of prepreg containing a metalloid in the form of boron (Ref. Nos. 7 and 11) which are separated by a prepreg sheet which does not contain metalloid fiber (Ref. No. 9)." Honma's Figure 1, reproduced below, shows that Honma discloses a prepreg layer 5 of carbon fiber (white), a "hybrid" prepreg layer 7 of boron fiber and carbon fiber (gray), a prepreg layer 9 of ordinary carbon fiber (white); and a "hybrid" prepreg layer 11 of metal fiber and carbon fiber (red).

FIG. 1



Thus, like Hsu, Honma only teaches the use of metal fiber on the outside of the golf club shaft. Honma even notes that because of this external arrangement of the metal fibers, which are visible on the shaft's exterior, "the golf club shaft is excellent in terms of appearance." (col. 5, lines 8-9).

The Office Action also cited to layer 7 which is not on the outside. That layer, however, is formed from a combination of boron fiber and carbon fiber. Moreover, as clear from its size relative to the other layers in Figures 5(a) to 5(f) below (layer 7 is shown in dark gray), it is wrapped along the entire length of the golf club shaft:



In view of the above, layer 7 is not relevant to Applicant's claimed invention because: (1) "[b]oron is a nonmetal"[1]; and (2) it is not wrapped "between a first distal location at a tip of the shaft and a second more proximal location of the shaft that is less than the full length of the shaft" as required by amended Claim 1.

[1] Zumdahl, Steven, Chemistry 3rd Edition, D.C. Heath and Company, 1993, p.876 (copy attached).

CONCLUSION

For the reasons set forth above, Applicant respectfully submits that Claims 1, 3, 4, 6-13, and 45 are patentable over the cited references. Accordingly, the application is believed to be in condition for allowance. The Examiner is encouraged to telephone the undersigned if it appears that a phone conference would further this case in any way.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on April 21, 2004

by Angela Williams

Signature

April 21, 2004

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Using the faraday (96,485 C/mol e^-), we can calculate the coulombs of charge:

$$8.22 \times 10^4 \text{ mol } e^- \times \frac{96{,}485 \text{ C}}{\text{mol } e^-} = 7.93 \times 10^9 \text{ C}$$

Since an ampere is a coulomb of charge per second, we can now calculate the time required:

$$\frac{7.93 \times 10^9 \text{ C}}{1.00 \times 10^2 \text{ C/s}} = 7.93 \times 10^7 \text{ s} \quad \text{or} \quad 918 \text{ days}$$

18.5 The Group 3A Elements

3A
B
Al
Ga
In
Tl

Purpose

- To show the general trend from nonmetallic to metallic behavior in Group 3A.

The Group 3A elements (valence-electron configuration ns^2np^1) generally show the increase in metallic character in going down the group that is characteristic of the representative elements. Some physical properties, sources, and methods of preparation for the Group 3A elements are summarized in Table 18.9.

Boron is a nonmetal, and most of its compounds are covalent. The most interesting compounds of boron are the covalent hydrides called **boranes.** We might expect BH_3 to be the simplest hydride, since boron has three valence electrons to share with three hydrogen atoms. However, this compound is unstable, and the simplest known member of the series is diborane (B_2H_6), with the structure shown in Fig. 18.9(a). In this molecule the terminal B—H bonds are normal covalent bonds, each involving one electron pair. The bridging bonds are three-center bonds similar to those in solid BeH_2. Another interesting borane contains the square pyramidal B_5H_9

Table 18.9

Selected Physical Properties, Sources, and Methods of Preparation for the Group 3A Elements

Element	Radius of M^{3+} (pm)	Ionization Energy (kJ/mol)	$\mathscr{E}°$ (V) for $M^{3+} + 3e^- \rightarrow M$	Sources	Method of Preparation
Boron	20	798	—	Kernite, a form of borax ($Na_2B_4O_7 \cdot 4H_2O$)	Reduction by Mg or H_2
Aluminum	51	581	−1.71	Bauxite (Al_2O_3)	Electrolysis of Al_2O_3 in molten Na_3AlF_6
Gallium	62	577	−0.53	Traces in various minerals	Reduction with H_2 or electrolysis
Indium	81	556	−0.34	Traces in various minerals	Reduction with H_2 or electrolysis
Thallium	95	589	0.72	Traces in various minerals	Electrolysis